Name_____

Three-Dimensional Vector Cross Products

Date_____ Period_____

Find the cross product of the given vectors.

1) $\vec{a} \times \vec{b}$
$\vec{a} = \langle -9, 5, -3 \rangle$
$\vec{b} = \langle 2, 9, 2 \rangle$

2) $\overrightarrow{AB} \times \overrightarrow{CD}$
Given: $A = (-6, -2, 6)$ $B = (-5, -5, -3)$
       $C = (8, 7, -6)$ $D = (-5, -4, -1)$

Find a vector that is perpendicular to the given vectors.

3) $\vec{u} = \langle -5, 6, 7 \rangle$
$\vec{v} = \langle 1, -9, 0 \rangle$

4) $\overrightarrow{RS}$ and $\overrightarrow{RT}$
Given: $R = (3, 7, 2)$ $S = (1, 7, -7)$
       $T = (-1, -5, 6)$

Find the area of a triangle with the given vectors as two adjacent sides.

5) $\vec{a} = \langle 9, -2, 9 \rangle$
$\vec{b} = \langle 4, 9, -2 \rangle$

6) $\vec{u} = \langle 0, 2, -1 \rangle$
$\vec{v} = \langle -3, 6, 8 \rangle$

Find the area of a triangle with the given vertices.

7) $R = (3, -2, 7)$
   $S = (0, -7, 9)$
   $T = (6, -7, 9)$

8) $A = (6, 9, -8)$
   $B = (0, -9, -1)$
   $C = (-8, -9, 2)$

Find the area of a parallelogram with the given vectors as two adjacent sides.

9) $\vec{u} = \langle -7, 1, 0 \rangle$
   $\vec{v} = \langle 7, -5, -1 \rangle$

10) $\overrightarrow{AB}$ and $\overrightarrow{AC}$
    Given: $A = (-8, 5, -8)$ $B = (4, 8, -8)$
    $C = (6, -3, 8)$

Find the volume of a parallelepiped with the given vectors as adjacent edges.

11) $\vec{u} = \langle -6, 4, -9 \rangle$
    $\vec{v} = \langle 2, -5, 8 \rangle$
    $\vec{w} = \langle 0, -4, 8 \rangle$

12) $\overrightarrow{TX}$, $\overrightarrow{TY}$, and $\overrightarrow{TZ}$
    Given: $T = (0, -4, -8)$ $X = (8, 1, -9)$
    $Y = (-1, -5, -2)$ $Z = (0, -8, 3)$

Name_____

Three-Dimensional Vector Cross Products

Date_____ Period_____

Find the cross product of the given vectors.

1) $\vec{a} \times \vec{b}$
$\vec{a} = \langle -9, 5, -3 \rangle$
$\vec{b} = \langle 2, 9, 2 \rangle$

$\langle 37, 12, -91 \rangle$

2) $\overrightarrow{AB} \times \overrightarrow{CD}$
Given: $A = (-6, -2, 6)$ $B = (-5, -5, -3)$
$C = (8, 7, -6)$ $D = (-5, -4, -1)$

$\langle -114, 112, -50 \rangle$

Find a vector that is perpendicular to the given vectors.

3) $\vec{u} = \langle -5, 6, 7 \rangle$
$\vec{v} = \langle 1, -9, 0 \rangle$

$\langle -63, -7, -39 \rangle$

4) $\overrightarrow{RS}$ and $\overrightarrow{RT}$
Given: $R = (3, 7, 2)$ $S = (1, 7, -7)$
$T = (-1, -5, 6)$

$\langle 108, -44, -24 \rangle$

Find the area of a triangle with the given vectors as two adjacent sides.

5) $\vec{a} = \langle 9, -2, 9 \rangle$
$\vec{b} = \langle 4, 9, -2 \rangle$

$\dfrac{\sqrt{16766}}{2} \approx 64.742 \ units^2$

6) $\vec{u} = \langle 0, 2, -1 \rangle$
$\vec{v} = \langle -3, 6, 8 \rangle$

$\dfrac{23}{2} = 11.5 \ units^2$

Find the area of a triangle with the given vertices.

7) $R = (3, -2, 7)$
   $S = (0, -7, 9)$
   $T = (6, -7, 9)$

   $3\sqrt{29} \approx 16.155\ units^2$

8) $A = (6, 9, -8)$
   $B = (0, -9, -1)$
   $C = (-8, -9, 2)$

   $\sqrt{6274} \approx 79.209\ units^2$

Find the area of a parallelogram with the given vectors as two adjacent sides.

9) $\vec{u} = \langle -7, 1, 0 \rangle$
   $\vec{v} = \langle 7, -5, -1 \rangle$

   $\sqrt{834} \approx 28.879\ units^2$

10) $\overrightarrow{AB}$ and $\overrightarrow{AC}$
    Given: $A = (-8, 5, -8)$ $B = (4, 8, -8)$
    $C = (6, -3, 8)$

    $42\sqrt{33} \approx 241.272\ units^2$

Find the volume of a parallelepiped with the given vectors as adjacent edges.

11) $\vec{u} = \langle -6, 4, -9 \rangle$
    $\vec{v} = \langle 2, -5, 8 \rangle$
    $\vec{w} = \langle 0, -4, 8 \rangle$

    $56\ units^3$

12) $\overrightarrow{TX}$, $\overrightarrow{TY}$, and $\overrightarrow{TZ}$
    Given: $T = (0, -4, -8)$ $X = (8, 1, -9)$
    $Y = (-1, -5, -2)$ $Z = (0, -8, 3)$

    $155\ units^3$